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Translation of

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Japanese Published Unexamined Patent Application (A) No. 57-099298, published June 19, 1982; Application Filing No. 55-173215, filed December 10, 1980; Inventor(s): Sooichi Fukuzawa et al.; Assignee: Hitachi Corporation; Japanese Title: Regenerative Pumps

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REGENERATIVE PUMPS

CLAIM(S)

A regenerative pump characterized in that a vane groove is inclined in the range of 2°- 9° in the direction opposite to the impeller rotation direction from impeller radial direction.

DETAILED DESCRIPTION OF THE INVENTION

The present invention was produced by examining a function of a vane in a regenerative pump, empirically finding its improved structure for eliminating noise generation based on the examination result, and by confirming that providing the conventionally used vane groove in the radial direction with an inclination in the range of 2 - 9° in the direction opposite to the impeller rotation direction from the radial direction produces an effect of reducing noise and increasing lift.

The structure and the operation of the prior art regenerative pump are explained below with reference to Fig. 1 and Fig. 2.

In the figures, 1 indicates an impeller, around which a vane groove 9 is made along the radial direction R with a constant width of flow passage, forming the vane 3; 2 indicates a rotary shaft for rotating the impeller 1 in the direction of arrow P; 4 indicates a balancing hole installed on the impeller 1 to balance the front pressure and the rear pressure of impeller. As shown in Fig. 3, on the casing 5 surrounding the impeller 1, are made a flow passage 10 surrounding the vane 3 and a barrier wall 6 for separating the intake port 7 from jetting port 8, as shown in Fig. 1.

With the regenerative pump shown in the figure, once the impeller 1 is rotated in the direction of arrow P after filling the fluid in the casing 5, the low pressure fluid is energized in the neighborhood of intake port 7 while flowing in the vane groove 9 from the inner circumference to the outer circumference, and is drained out to the flow passage 10. The drained out fluid again flows into the vane groove 9 from the inner circumference section, is again energized, and is drained out to the flow passage 10 with high pressure. Thus, the fluid circulation from the vane groove outer circumference section to the flow passage and from flow passage to the vane groove inner

circumference is repeated a few times, and the fluid is jetted out from the jetting port 8 with high pressure.

When the flow condition of the fluid during the pump operation was observed through a transparent casing, it was found that the fluid did not flow into the vane groove at an angle toward the radial direction but the flow angle was displaced from the direction B opposite to the impeller rotation direction P. The same result was inferred from the condition of a released coating that had been applied to the vane groove.

By this, it was found that in the prior art vane groove made in the radial direction, a dead water zone was generated in the neighborhood of the vane, reducing the effect of circulation from the flow passage. Therefore, not only the fluid introduced into the vane groove cannot be provided with sufficient energy but also noise gets louder due to cavitation caused by the fluid release.

Therefore, a pump with suction height 8 m and motor output power 300 W was prepared. And, a few impellers with a groove having an inclination angle Θ°in the direction B opposite to vane rotation direction P from the radial direction R, as shown in Fig. 5, were experimented for noise and lift.

The result is shown in Fig. 6. In the case of 0° - 5 from the impeller rotation direction, the cut off lift is highest. The noise is lowest at a 1 m

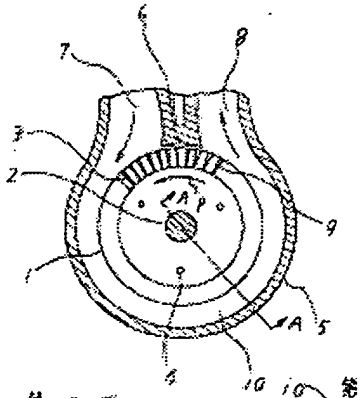
distance from the pump front face. In addition, it was confirmed that the noise reduction and lift increase were still effective in the range of $\Theta = -2°$ to $-9°$.

As explained above, in the present invention, by making the vane groove 9 inclined in the direction opposite to the rotation direction of impeller 1 from the radial direction within the prescribed range, performance of the regenerative pump can be significantly improved, which is a great advantage for industrial use.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a cross-sectional view of the prior art regenerative pump. Fig. 2 shows an anterior view of the vane groove section. Fig. 3 shows a cross-sectional view of the flow passage. Fig. 4 shows a cross-sectional view of the regenerative pump of the present invention. Fig. 5 shows an anterior view of the vane groove. Fig. 6 shows a linear graph indicating the comparison of the cut off lift and the noise level between the regenerative pump of the present invention and the regenerative pump of the prior art.

第1図



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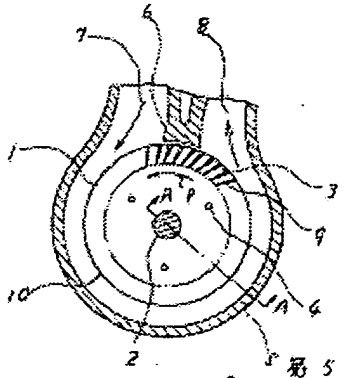

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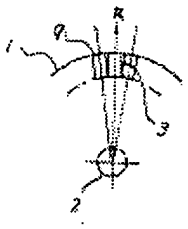

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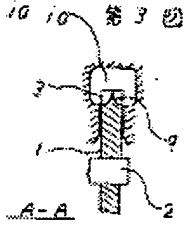

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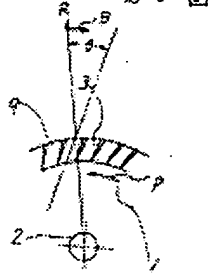

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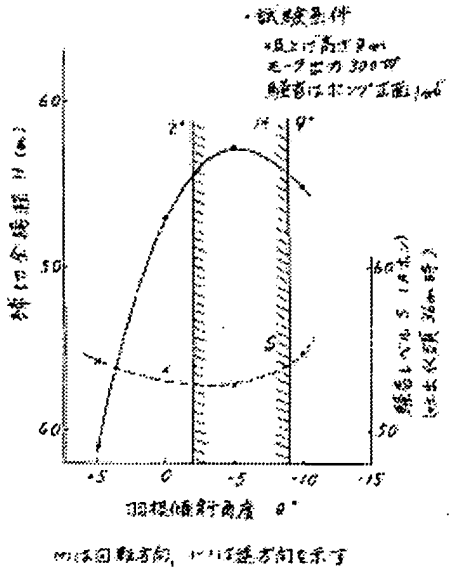

mは回転方向、rは径方向を示す

Translations
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Akiko Smith